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(56) **References Cited**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

U.S. PATENT DOCUMENTS

This patent is subject to a terminal disclaimer.

3,914,938	A	10/1975	Cornell et al.
5,406,778	A	4/1995	Lamb et al.

(Continued)

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FOREIGN PATENT DOCUMENTS

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DE	4224359	C1	5/1993
DE	10148326	A1	4/2003

(Continued)

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OTHER PUBLICATIONS

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(Continued)

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(57) **ABSTRACT**

Electronic control systems and related control methods for controlling electric auxiliary motors for performing work, such as electric deck motors for mower blades. The apparatus is shown in use with a vehicle that includes a mowing deck. Features of the control systems allow for safe and efficient use of the vehicle.

18 Claims, 13 Drawing Sheets

